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Acyl-CoAs of Conjugated Linoleic Acid as Substrates for Bovine Mammary Gland Microsomal Diacylglycerol Acyltransferase

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Conjugated linoleic acid (CLA), a naturally occurring group of 18-carbon di-unsaturated fatty acids found in milk fat, is known to have a number of health benefits including decreasing the onset of cancer and heart disease. It is possible to increase the CLA content of milk fat in dairy cattle through dietary means, although other components of milk are affected. *Trans*-10, *cis*-12 CLA may lead to milk fat depression through inhibitory effects on processes associated with fat synthesis. Diacylglycerol acyltransferase (DGAT, EC 2.3.1.20) catalyzes the acyl-CoA-dependent acylation of *sn*-1, 2-diacylglycerol to generate triacylglycerol, the final step in the synthesis of milk fat. Recent studies have shown that an allele of bovine *DGAT1* is associated with low milk fat content. *Trans*-10, *cis*-12 CLA might interfere with the activity and/or expression of DGAT. Competition assays of microsomal DGAT activity from mammary gland tissue of lactating cows were conducted using a mixture of [¹⁴C]oleoyl (18:1)-CoA with equimolar amounts of either unlabeled 18:1-CoA, *cis*-9, *trans*-11 CLA-CoA or *trans*-10, *cis*-12 CLA-CoA. Preliminary results suggested that *cis*-9, *trans*-11 CLA-CoA was equally effective as 18:1-CoA as a substrate for DGAT, but *trans*-10, *cis*-12 CLA-CoA slightly reduced the incorporation of radiolabeled 18:1 into TAG. Possible explanations for the decreased incorporation of [¹⁴C]18:1 in the presence *trans*-10, *cis*-12 CLA-CoA include inhibition of DGAT activity by the thioester of this CLA isomer or enhanced selectivity of DGAT for *trans*-10, *cis*-12 CLA-CoA over 18:1-CoA.